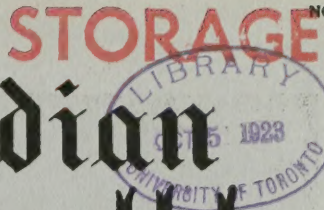


The Canadian Medical Monthly



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AUGUST, 1920

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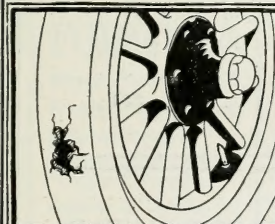
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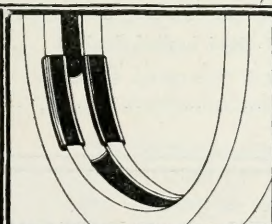
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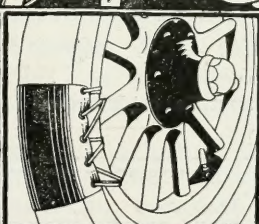
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THE CANADIAN MEDICAL MONTHLY

VOLUME V

AUGUST, 1920

NUMBER 8

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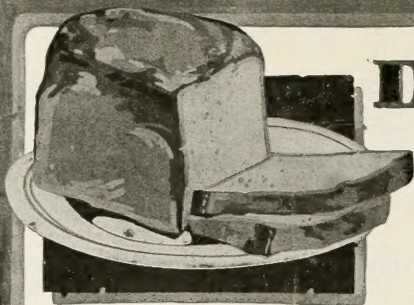
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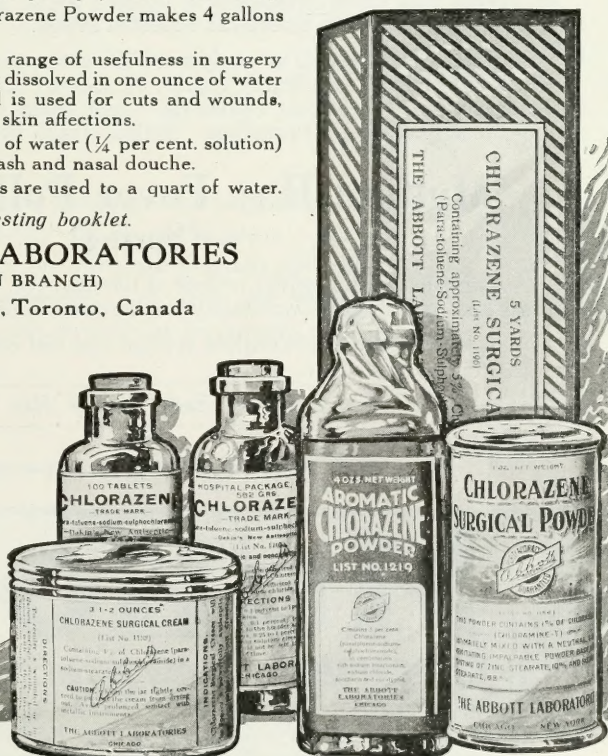
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Hay Fever Time

The illustration shows four calendar pages for the months of June, July, August, and September in 1920. The pages are arranged in a circular pattern around a central logo. The logo is a circular emblem with a shield in the center. Inside the shield is a beaker with a flame or light above it. The text 'FOR THE CONSERVATION OF LIFE' is written across the shield, and 'MULFORD LABORATORIES' is written around the bottom of the circle.

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The Canadian Medical Monthly

VOL. V., NO. 8

TORONTO, CANADA

AUGUST, 1920

EDITORIAL

POST GRADUATE WORK IN CANADA.

In temporarily withdrawing his provincial membership, a Canadian practitioner writes from a point in the United States deploring the conditions existing in this country which force those seeking post graduate work to leave the confines of our Dominion and, at very great expense, cross our southern boundary or proceed across the ocean.

Up to the present time the medical teaching centres in the Dominion have largely directed their energies to production, but have in the main entirely failed to measure up to the responsibility of maintaining the efficiency of their product, or developing along specialized lines those members of the profession who are desirous of adding to their stock-in-trade, namely, their knowledge of the medical sciences.

"Where can one go in Canada to brush up?" From every quarter of the Dominion this query arises. The interrogation brings only one answer, an inevitable negative, with the result that the more ambitious and plenary cut loose from their activities and proceed to distant centres, while many an other is content to carry on at home and bemoan the fate which his alma mater has decreed for him.

The present year has witnessed some evidence of activity in one or two centres, with beneficial results to some few men. The Ontario Medical Association has inaugurated a post-graduate schedule which is appealing to many groups of practitioners throughout the Province. But while all this is very commendable it falls far short of the requirements. If our medical faculties and teachers do not go further and bend every effort toward supplying the need which is felt and which is only partially being requited outside of Canada, the bulk of the profession and the public will continue to be losers.

Such criticism is not levelled in a spirit of personal fault-finding. Our authorities may reply that all that is humanly possible is being done, with the facilities which are available. But the facilities must be increased and the work must be done or we fall by the wayside as a medical profession, both as teachers and practitioners. Such shall not be the case when the issue is boldly faced by the *Almae Matres* who strive to maintain the respect and allegiance of their children by granting them the privilege of being held rather than of having to stray.

DRUG REFORM

The Federal Department of Health has requested us to publish a report on some changes which are being effected in the manufacture and sale of narcotics. In doing so we desire to express our commendation on the action which is being taken and we feel that practitioners generally will look with favor upon the plan which is outlined.

There has been too much laxity in Canada in the past with reference to the sale of narcotics. Opinions vary as to the extent to which drugs are abused in this country and as to the number of habitués. But it is well known that the traffic needs curbing, which can only be accomplished by strict supervision and control. The profession undoubtedly will aid the Department in every possible manner in an endeavor to suppress an evil which, if allowed to continue, would become a national menace.

AMENDMENT TO THE OPIUM AND NARCOTIC DRUG ACT.

From The Department of Health, Ottawa, July, 1920.

Under the amendment to the Opium and Narcotic Drug Act, which was passed at the recent session of Parliament, it is provided that the same shall come into force on a date to be fixed by proclamation of the Governor-in Council.

It is the intention of the Department to have this Act proclaimed and come into force on or about September 1st, next.

Under the new Act, all wholesale druggists, manufacturers or dealers are required to obtain a license to deal in these drugs, for which an annual fee of Twenty Five (\$25) Dollars is charged. All retail druggists who manufacture narcotic drugs, or preparations containing the same, are required to obtain a license, for which an annual fee of Five (\$5) is charged. All druggists, other than those who manufacture, and every physician, veterinary surgeon and dentist is required to make a declaration that they are engaged in the sale or distribution of these drugs. Forms will be supplied by the Department on application to be filled in and returned as required under the Act.

The Act also requires all druggists, whether wholesale or retail, and all manufacturers to keep a record of their receipts, together with a record of the quantity manufactured, and a record of their sales. These records are required to be kept in a special book kept for this purpose, and after a prescribed form.

Another important change under the new Act is the limiting of the number of ports in Canada at which these drugs may be imported or exported, and the provisions whereby opium and other drugs intended for export must be packed and marked in such a manner as to denote the contents of the packages.

Provision is made under the Act for the sale of preparations intended for internal use which do not contain more than two grains of Opium, or more than one-fourth of a grain of Morphine, or more than one-eighth of a grain of Heroin, or more than one grain of Codeine to the fluid ounce. Provided, however, that such preparations must be medicated to sufficiently preclude the possibility of their being purchased simply to obtain the narcotic effect, and further that such preparations must have printed on the label or wrapper in a conspicuous place the following warning: "IT IS UNLAWFUL TO ADMINISTER THIS PREPARATION TO A CHILD UNDER TWO YEARS OF AGE AS IT CONTAINS OPIUM AND IS DANGEROUS TO ITS LIFE."

The maximum penalty for infraction of the Act has been increased from Five Hundred (\$500) Dollars to One Thousand (\$1,000) Dollars, and a minimum penalty of Two Hundred (\$200) Dollars is provided.

It is the intention of the Department at a later date to furnish all druggists with a copy of the regulations, together with a copy of the Opium and Narcotic Drug Act, with amendments to date.

AERIAL EQUILIBRIUM AND ORIENTATION*

MAJOR B. O'REILLY, O. B. E.,
(Senior Medical Officer, Royal Air Force, Canada.)

In collaboration with
CAPTAIN W. G. MACKECHNIE, C. A. M. C.

The relationship of the maintenance of balance to orientation in the air is extremely complicated, and while both are more or less independent, yet they are so closely related that it is impossible to state where one breaks off and the other commences.

The development of the faculty of "finding one's way" about varies considerably in different individuals; the majority, however, are probably what are known as "visuals," but in a certain number this faculty is apparently intuitive.

Vertigo in the air, also, is so intimately connected with the subject of equilibrium that it is almost impossible to separate them completely for the purpose of study.

The maintenance of the erect posture of the human body on the ground is accomplished by means of the correlation in the brain, particularly in the cerebellum, of afferent stimuli reaching it from a number of different sources.

The chief of these impulses are derived, according to the most recent opinions of eminent physiologists, from the skin—particularly that of the soles of the feet,—from the eyes, muscles, joints, and from the labyrinth of the internal ear.

While all the above sense organs undoubtedly contribute to the maintenance of equilibrium in flight, the order of their relative importance has up to the present not been satisfactorily or conclusively demonstrated.

The importance which the sense of vision bears to the maintenance of equilibrium in the air preponderates very considerably over all the other special sensations. The majority of pilots keep their machines level in the antero-posterior plane by noting the relative positions of the horizon and the cap of the radiator; similarly, they usually maintain lateral stability by watching the relation of the wing-tips to the horizon.

The problems met with in the study of night or Cloud Flying are similar to those which are encountered in those experiments in which the blindfolded pilots have been given control of machines; but it should be noted in this connection

*Published under the authority of the Air Ministry, Great Britain.

2. Presented at the Academy of Medicine, Toronto, May, 1920.

that even on the darkest night it is seldom that a pilot cannot see a sufficient horizon for his guidance.

The only difference between flying blindfolded and in a dense cloud or mist is that in the latter instances the pilot is able to utilize his navigating instruments to assist in maintaining the stability of the plane.

Experienced pilots invariably state that without such instruments in a fog or cloud they are practically helpless, and are unable to control the movements of their machines for more than very short distances.

The sensations derived from the skin, after those from the eyes, probably preponderate over all other stimuli in conveying to the pilot accurate information as to the position and movements of his machine while in the air. It is certain also that the stimuli received from the integument covering the lower part of the back, the upper one-third of the thighs and that of the buttocks are extremely important, particularly when climbing or descending, and in "banks." Practically all observant pilots, on interrogation, will corroborate this view.

Again it is very well known that usually the first intimation which a pilot receives of "side-slipping" comes from the "wind pressure" on the skin of the side of the head and neck. Some tie a short string to one of the center struts and by keeping an eye fixed on this, note its lateral deviation while "side-slipping." This method, however, is not one to be recommended and is never used by experienced aviators.

Muscle and Joint-Sense also contribute very largely to the maintenance of equilibrium; in fact the information received from the "Joy Stick," or in other words the "feel of the air" next to vision, is probably the most important factor in the maintenance of equilibrium.

Experienced pilots "fly subconsciously," maintaining and correcting the balance of their machines automatically. These men to all intents and purposes, become an integral part of their aeroplanes and do not attempt to drive it as they would a motor car. They do not resist its gyrations, but instinctively allow their bodies to follow the changes of position, as at sea in following the roll of a steamer, or as in turning corners sharply on a bicycle.

It is quite possible that different individuals receive varying amounts of useful stimuli from the different sense organs. For instance, one may have his semi-circular canals developed to a considerably greater extent than another and will rely possibly less on his sense of sight than will another individual whose visual sensations are extremely acute.

The role played by the Semicircular Canals is at the present time the center of a very considerable controversy, and as over 8,000 individuals were "turned" in the Royal Air Force, Canada, and as a number of these had had trouble in the air, there would seem to be justification in drawing certain deductions therefrom.

The view that the Labyrinth was the chief "Motion Sensing" organ of the body in flying, was brought forward by Lieut-Colonel Isaac Jones, U. S. A., and at first generally accepted. In consequence, the American Government on entering the war required that all cadets be subjected to the "Rotation Tests," and certain normal standards which will be referred to later were arbitrarily laid down for guidance of the examining boards.

A reaction has recently taken place and many investigators have advanced the view that the Internal Ear contributes but little to the ability to fly correctly.

In the American Air Service Manual will be found a detailed report with charts of certain experiments on normal individuals who had not flown previously, and who, after being blindfolded, were put through a series of evolutions in the air as passengers, being asked by means of inter-communicating telephones to describe to the best of their ability the various motions of the aeroplane in which they were travelling.

Another series of similar experiments was undertaken with deaf-mutes having "dead labyrinths," and who were therefore deprived of any information or sensations normally derived from this source.

In spite of statements to the contrary in the text of the report, a close study of these charts would seem to show that many even perfectly normal individuals were unable to accurately "sense" the direction of even the more rapid and violent movements undergone while "stunting," apparently in some cases a certain amount of improvements in perception took place after repeated flights.

The experiments on "deaf-mutes" showed that while they were unable, apparently, to recognize to the same degree as normal individuals similar evolutions, that they, too, seem to show an improvement as the result of experience in the air, so that it is obvious that the other special senses must contribute to a considerable extent to the recognition of position and movements.

A number of experiments were also undertaken in fast-moving elevators, but the results obtained seem to be far from conclusive.

They apparently showed nothing beyond the facts that perception of quick up-and-down movements is at least partially accomplished by means of the semicircular canals, and that these organs are unable to pick up with any degree of accuracy the slower movements.

In the resumé of the report referred to, the statements appear that "Experience in aeroplane flights shows that blindfolded normal persons perceive motion changes accurately," and also that "A man can accomplish a certain kind of flying blindfolded."

In a series of experiments directed by Major O'Reilly, certain experienced R. A. F. pilots, having over 500 hours' flying, were taken into the air in dual machines, then blindfolded and given complete control. In every case, these pilots were able to control their machines for only short distances even on straight flights. On attempting turns and even the simplest manœuvres, they "stalled" their machines while in the air, side-slipped or nose-dived while thus flying unaided by their visual sensations.

They were even unable to fly in a straight line, not being able to allow for the torque of the propellor, and in consequence their course approximated the arc of a large circle; there was also a marked tendency to climb, the position being recognized solely by the differences in the sound of the engine.

It is interesting to note that the chief means by which these blindfolded normal pilots were able to recognize the fact that they had lost control of their machines was through the skin, joint and muscle sensations, particularly those received from the "Joy Stick" and that of the wind-pressure on the side of the head.

It may be reasonably concluded as the result of the investigation undertaken to date that the semicircular canals are able to pick up and convey to the brain only those impulses generated by sudden changes of position, and that these, even, are not always accurately interpreted by the higher centers.

A practical illustration of this is to be found in the fact that during the same series of experiments experienced pilots were flown as passengers and the planes gently rotated on their longitudinal axes by their companions without the former being aware of the alteration in position. The same individuals, however, at once were able to detect any sudden banking or other manoeuvre, but even the direction of these rapid changes is often interpreted incorrectly.

Again, attention may be drawn to the well-known fact that in cloud or fog flying, where no horizon is visible, the best pilots not infrequently lose control of their planes, and have even emerged with an inverted machine, or in a "spiral," without being aware of their actual position. An excellent example of this has been recorded by the first non-stop Trans-Atlantic Flight.

These facts are absolutely incontrovertible, and go to show that while the action of the semicircular canals unquestionably contributes to a certain extent to the recognition of motion and direction, yet the fact remains that without the sense of vision, the pilot in the air is absolutely helpless.

It is well known that apparently identical evolutions may be carried out by two pilots, but that if in one case flying be perfect and on an "instantaneous center," and in the other, although the evolutions are apparently similar, yet the irregularities and lack of smoothness are such that centrifugal force is not evenly exerted, that the majority of passengers will in the latter case feel nausea, etc., as a result, probably, of the stimulation of the canals of the internal ear, whereas in the former case no unpleasant sensations whatever are produced, since the endolymph is but little affected, and consequently no disturbing afferent impulses reach the cerebral centres or the cerebellum.

In connection with the use of instruments, it is interesting to note that in perfect "stunt flying," that is to say, where the evolutions carried out from an "instantaneous center," instruments are of little value since the levels, clinometers, etc., are prevented by centrifugal force from acting in the normal way.

The relationship of the Internal Ear to "Stunting" is the subject of an extensive report by Lewis and Fisher in the American Air Service Medical Manual.

In it the authors assume that "stunt flying is essentially an ear problem," and account for the majority of "crashes" by the onset of dizziness.

As regards Vertigo, in a series of 72 consecutive "spins" resulting in "crashes" reported in the R. A. F., Canada, in not one did dizziness appear as a causative factor, although careful inquiries were made in every case in which the pilot survived.

It should be noted that it is quite common for Cadet Pilots to feel vertigo during their first few evolutions, particularly in "tight spirals" and "spins," but that it very seldom persists in subsequent flights. If the passenger, however, is instructed to fix his eyes on a certain point on the earth beneath him and as near the center of the circle around which the plane is rotating as possible, he but rarely feels any unpleasant sensations.

Lewis and Fisher suggest that since the vertigo occasionally felt during "Stunting" is in their opinion due to the movements of the endolymph in the semicircular canals, that the pilot should, in order to neutralize these sensations, on coming out of certain evolutions, tilt his head sharply to one or the other side, and by so doing keep the "plane of vertigo" horizontal, and thus lessen or prevent dizziness.

This remedy is open to criticism, since, if adopted, the pilot would at once become in a sense more or less detached from his machine, and thus encounter serious difficulties in maintaining his equilibrium and correct orientation. In addition, this abnormal position might to some extent interfere with the cerebral circulation through jugular congestion.

In the same article, the statement which appears that the "Experienced stunt flyer is not as a rule upset by vertigo because of his many hours of practice" is quite true, and these hours may be materially reduced if it is explained to the pilot that aerial vertigo is largely ocular, and may to a great extent be avoided by focusing the eyes on some fixed object on the ground, and thus preventing the appearance of an induced nystagmus.

It is well known that looking at the upper wing-tip or horizon during rotating movements is productive, even in experienced pilots, of vertigo going on in some cases to the point of nausea, which symptoms, the writer suggests, may in part be due to the nystagmus, similar to that seen in individuals looking from the window of a moving train.

The writer advises, should dizziness appear during spinning or rotary evolutions, that it may also be alleviated momentarily by short jerking movements of the head in the opposite direction to that in which the plane is turning, in order to neutralize excessive currents in the endolymph in the one plane, as commonly practiced by "whirling dancers;" and also, as noted above, by fixing the eyes on a stationary object on the earth as near the centre of the plane's circuit as possible.

Vertigo induced by rotary movements of the body is unquestionably made less and less disturbing by continuous repetitions, with the exception of those cases due to organic changes either in the cerebellum or labyrinth.

It is a well known fact that the unpleasant sensations experienced during the early part of the descent in a rapidly moving elevator may be alleviated by looking at the ceiling and so placing the less sensitive horizontal canals in the vertical plane. In this connection, it should be remembered that the discomfort is usually experienced during the downward movement, and that as this movement is always a sudden one, in view of the conclusions above arrived at, such a result might reasonably be expected.

One practical point to be noted as the result of the study of the senses which contribute to the maintenance of equilibrium is that on account of the importance of the afferent stimuli received from the eyes, pilots must of necessity have perfect vision; and this will in the future be even more necessary since pilots will probably then be flying machines from protected cabins.

Whether or not it will ever be advisable to equip machines with enclosed cockpits for the pilots, in view of the above remarks, is a question which will have to be decided, the comfort of the pilot on one hand being balanced against the loss of certain skin sensations on the other; the more so since in the large machines in which a wheel control replaces the sensitive "joy stick," the "feel" of the air will also be reduced to a minimum.

It is probable also that in the near future aeroplanes will be so constructed as to be almost automatically stable, and by means of gyroscopic instruments, what little instability remains will be controlled by this latter means. The pilot will, therefore, while actually in the air have but little else to do than to keep his proper altitude, and on his correct course.

It would seem then that only during "taking off" and "landing" will much actual skill be required in flying, and that the sense-organs from which the pilot will derive most of the necessary information will be the eyes.

In spite of the above remarks, I would suggest that precautions be taken to insure that every pilot is possessed of a complete set of normal peripheral sense organs, for no matter how accurate or complete an apparatus may be supplied to assist in the maintenance of stability of his aeroplane, he may at any time be compelled to assume complete control in the event of failure of any of his instruments.

Ruggles of New York has perfected an apparatus called an orientator, probably based on an instrument used by the Royal Flying Corps some years ago.

The object of this apparatus is to accustom the individual seated therein to rapid rotary movements in all planes of space.

It consists of the center or cockpit section of a fuselage slung in three concentric supporting rings, and equipped with controls which are electrically connected to motors at the points of suspension.

The fuselage is thus swung on an axle somewhat after the manner of a compass, and can be rotated at will in any of the three planes of space. Changes of position are thus made possible in all directions, except actual vertical or forward movements.

The small motors which lie at the ends of the axles are controlled not only from the pilot's seat, but by a "dual control" situated on the ground several feet away from the machine, and so arranged that the movements of the orientator are under the direction either of the pilot or the observer.

The inventor states that the objects of his apparatus are: First, to enable instructors to accustom their pupils to the disturbing effects of rotary movements and to inversion of the body; and, second, to teach the use of controls before actually using them in the air.

Unquestionably, the orientator may be used for the first purpose with satisfactory results. For instance, cadets may be "spun" in the apparatus, may be put through evolutions closely resembling "tight spirals," may be looped or even "rolled," and thus become accustomed to the vertigo which is so produced, and thus shorten the period of air training; but it must be remembered that the very considerable effects of centrifugal force are in such cases not similarly exhibited and that therefore the movements in the orientator and those which are experienced in the air are far from being identical and that the artificial ones are by far the most violent and disturbing.

The question of the possibility of using the orientator for the purpose of giving instruction in the use of controls would seem to be most unsatisfactory, since although the evolutions resemble those experienced in the air, yet certain differences exist which would undoubtedly in many cases be quite sufficient to cause a novice to lose control of his machine when actually in flight.

"Spinning" may be simulated either in a revolving chair or in the orientator, but it should be noted that in coming out of an artificial spin the change is sudden and jerking, while in the air it is smooth and gradual. It is probably on account of this latter fact that pilots so seldom feel vertigo on levelling off their machines, since the endolymph is but little affected by smooth and comparatively slow movements.

Passing to a discussion on the relationship of vertigo and the auditory apparatus to flying, certain points in reference to diseases of the middle ear deserve attention.

Perforations of the tympanum should definitely prohibit a man from being accepted for training as a pilot, for several reasons, the first being the fact that since this condition in the majority of cases is the result of some previous infection, the possibility of an acquired predisposition to future attacks should be kept in mind, especially in view of the rapid changes in both temperature and pressure to which the pilot's eardrums are subjected.

Secondly, the relationship between the vertigo and aural conditions must be kept in mind. For instance, it is well known that marked dizziness may be produced as the result of unequal inflation of the two middle ears, as also it is, for example, through an obstruction of one of the eustachian tubes.

The close anatomical connection between naso-pharyngeal obstruction and the condition of the middle ear must also be remembered, for we know by ex-

perience that even slight degrees of obstruction in the upper respiratory passages, which on the ground would be symptomless, in a pilot who ascends, say, 5,000 feet, may produce a definite sense of discomfort, going on in some cases to the point of vertigo.

The history of a simple mastoid operation would not to the casual observer seem to be a sufficient reason for rejecting an applicant for the Air Force, but in view of the remarks made in the above paragraphs, the danger of a recurrence of the old otitis media must be kept in mind.

The above facts have been conclusively demonstrated since an appreciable number of recurrences of old middle-ear diseases have come to the author's notice, the lesions resulting from the original attack being so slight as to have been overlooked at the time of attestation.

Similar remarks apply also to minor degrees of nasal obstruction which often become markedly aggravated as a result of flying.

Finally, on account of the irritation of the drum membrane caused by the rapid variation in both pressure and temperature, the effect of the continuous roar of the unmuffled exhaust and rattle of the machine guns, it would seem that a normal auditory apparatus is required.

The relation of the internal ear to vertigo, nausea, etc., and the maintenance of equilibrium while in the air, next demands attention, having in view the bearing that "rotation tests" have on the subjects under discussion.

On and after November 1-17, all applicants for Cadet Pilots in the R. A. F., Canada, were required to pass the tests described below, as also were those for Observers, but in the latter case, a slightly lower standard was permitted.

Before the date above mentioned, a considerable number of cadets and pilots complaining of abnormal symptoms in the air were rotated unofficially, and as a result of these observations and in view of the recommendations of certain aurists attached to the United States Army Medical Service, it was decided by the General Officer commanding that no cadet be allowed to fly until it had been shown that his labyrinthine reactions conformed to the arbitrary standards decided upon.

It was fully recognized from the first, however, that unquestionably a certain number of cadets who would have made good pilots might be rejected as the result of the introduction of these tests, but it was felt, not only from a financial but from a humanitarian standpoint, that even if a few "crashes" only were averted as a result of the elimination of an occasional unfit man, that the procedure would justify itself, since each fully trained pilot represented an expenditure of close to \$10,000 to the Imperial Government and each wrecked aeroplane more than half this sum.

This Department was first placed under the direction of Capt. F. J. O'Connor, C. A. M. C., and later under that of Capt. W. G. Mackechnie, who were assisted by Capt. C. W. L. Clark and Capt. A. D. McKelvie.

The following technique was laid down and the paragraphs in connection with the subject which are shown in quotation marks are taken verbatim from the official report submitted by Capt. W. G. Mackechnie.

The type of chair used was a modification of that designed by Barany, and the fixation point for the observation of nystagmus a bullseye six inches in diameter on a white ground, placed at a distance of about thirty yards from the chair.

All observations were made opposite windows having a northern exposure in order to avoid bright sunlight, and the rotations were made first to the right and then to the left in every case.

(I.) *Nystagmus*

"The recruit is seated in a chair facing a window and with his head 30 degrees forward from the perpendicular, in order to bring his lateral semi-circular canals more nearly horizontal. His eyes are examined to see that there is no spontaneous nystagmus and that his muscles are normal. He is then told to close his eyes and is turned to the right ten times in twenty seconds.

"When the chair is stopped, he is instructed to look out of the window at the fixed object already referred to. The stop-watch is started and the duration and quality of the nystagmus is noted. It should be horizontal and to the left and should average about twenty-six seconds. The chair is then turned to the left and the results recorded, the nystagmus in this case being to the right.

(II.) *Past Pointing*

"With the head in the same position, the recruit with arm extended, elbow stiff and eyes closed, puts his first finger on that of the examiner which is held in front of him. He is then instructed to raise his right arm above his head and bring the finger back to that of the examiner. The same is done with the left hand, and in each case he should, if normal, accurately find the required point.

"With eyes still closed, he is then turned to the right ten times in ten seconds, the chair locked, and if normal, should past-point to the right an average of about three times with each hand, the arms being taken alternately. He is then turned to the left the same number of times and should similarly past-point to the left.

"Past-pointing once in each direction was considered enough to pass. Past-pointing over five times in each direction was viewed with suspicion, and marked ill-balance between the past-pointing to the right and that to the left rejected. The first error was usually about five inches, lessening on repetition of pointing,

(III.) *Falling*

"The recruit's head is now put 120 degrees forward from the perpendicular, his closed fists resting on his knees, his forehead on his fists, and with his eyes closed, thus bringing the vertical canals near to the horizontal.

"He is now turned to the right five times in ten seconds and when the chair stops, he is told to relax and sit upright, keeping his eyes closed. In so doing he should fall to the right. He is then turned to the left and should fall to the left.

(IV.) *The Caloric Test*

"Doubtful or border-line cases were given this additional examination, the technique of which is as follows:

"With the head 30 degrees forward, water at 68 degrees Fahrenheit is run from a fountain into the right ear, and the length of time noted before which nystagmus starts, about forty seconds being the average.

"The nystagmus should be rotary and to the left, as the superior canals are thus stimulated.

"The eyes are now closed and the past-pointing with both arms should be to the right and the falling also to the right.

"The head is now put 60 degrees back from the perpendicular, when the nystagmus should continue to be left but become horizontal.

"The left ear is done in the same way, the direction of the reactions being reversed.

"Jones and Fisher point out that if after douching the horizontal canals by putting the head back 60 degrees and all reactions are normal, the medulla and inferior peduncles are healthy, while with normal reactions when the head is in the upright position, they conclude that tracts in the pons and middle peduncles of that side are unimpaired and that if the nystagmus, past-pointing and falling from stimulation of the labyrinth are all impaired, it suggests involvement of that labyrinth or the corresponding eighth nerve, but that if one of these reactions is normal, the lesions are probably central and the end organs intact."

"As the tracts leading from the central nuclei take different pathways to produce nystagmus, past-pointing and falling, it has been found that nystagmus may be abnormal while in the same case past-pointing and falling are normal. Other cases show normal nystagmus and falling, but defective past-pointing. Occasionally, candidates fall in the wrong direction."

From February 1, 1918, to November 11, 1918, 7,852 applicants were examined and 3.4 per cent of these were rejected.

The average nystagmus in the 7411 accepted men on turning to the right was 26.2 and to the left 26.8, it being the routine to turn first to the right in every case.

Of the 7411 accepted men, 119 had nausea and vomiting at the time of the test.

Of those rejected, severe nausea and vomiting was the determining factor in 45; 9 men had widely different nystagmus times on the two sides, and 11 showed marked asymmetry in past-pointing.

One hundred and fifty-three candidates were rejected for low nystagmus. These averaged 11.4 to the right and 11.8 to the left.

Of 325 applicants who were recommended as Cadet-Observers, all but one proved satisfactory. These men were selected from among those applicants whose nystagmus time was low, whose past-pointing was slight and whose falling reactions were at a minimum. Marked nausea and vomiting was, however,

considered sufficient cause for rejection. It is quite probable that the majority of these men would have made good pilots, but owing to the exigencies of the War, it was not considered that any time should be wasted in training a man as a pilot who might ultimately have to be remustered as an observer.

In order to check up the usefulness of these rotation tests, 85 Officers with first-class flying records and upwards of 100 hours in the air were examined by Capt. Mackechnie. It should be noted that in every case perfectly normal reactions were obtained, and that in one only did nausea and vomiting occur, and in this Officer but to a very slight degree.

Of this group of 85 pilots, 17 showed an after-turning nystagmus time of over 30 seconds on both sides, and 3 below 20 seconds on both sides.

Apparently the number of hours flown had no bearing on the duration of the oscillations, there being no definite relationship in the cases examined.

It should also be noted that without exception the times on the two sides were remarkably symmetrical, in only one instance was there a difference of more than 5 seconds in the two periods, and in that Officer, the variation was but 7 seconds.

The Officer showing the longest reaction was Captain J. L. W. who had flown 600 hours and whose periods were 40 seconds to the right and 35 to the left, and the least sensitive cases were those of Lieut. J. E. and Lieut. J. H. M. who both showed periods of 16 and 18 seconds and who had flown 235 and 650 hours respectively.

In one case only was the falling reaction at all exaggerated, Lt. H. S. D. W. A number of Officers, however, sat almost upright after turning.

It is also interesting to note the symmetry shown in the past-pointing tests. In only one was there a difference of more than three pointings on the two sides. Major P. R. M., who had done over 1000 hours in the air.

In addition to the Rotation Tests, applicants were examined in this Department for the presence of Rhomberg's Sign, were interrogated as to previous illness and also submitted to Flack's "Breath-Holding" Test.

According to theories advanced by some eminent aurists, the more sensitive a man is as shown by the Turning Tests (up to a certain point) having particular reference to a prolonged nystagmus period, the better pilot he should make, since he would be better enabled thereby to detect easily and correctly the various movements of his plane without the use of his eyes.

This, however, is apparently true only to a limited degree, for we have found certain pilots complaining of vertigo, nausea or vomiting in the air who showed an abnormally high nystagmus time (some with and some without violent falling reactions, and some with and some without nausea and vomiting in the chair) of which the following four cases are examples in point, all of which were accepted prior to routine turning tests on attestation and were referred on account of troubles in the air to the Medical Department for examination.

Case 1

R. A. F. Can. 152091—This cadet was given 75 minutes' dual instruction, during which time he showed dizziness and vomiting in the air and also vomiting after landing. He showed Nystagmus to the right 42 and to the left 40 seconds. His pointing both to the right and left was normal, but his falling reactions were so exaggerated that he fell out of the chair. He showed marked nausea and vomiting with each rotation, and it was with difficulty that the test was completed.

Case 2.

R. A. F. Can. 152168—This Cadet was given 3 hours' dual flying and showed marked vomiting on landing; he also complained of faintness while in the air. His nystagmus to the right was 40 and to the left 35 seconds. His pointing reactions were normal, his falling to the right slight and to the left marked. Severe nausea and vomiting occurred with each rotation.

Case 3.

R. A. F. Can. 154300—After 8½ hours' dual, instruction was discontinued on account of nausea and vomiting in the air, particularly during "Spins." Rotation showed symmetrical nystagmus of 39 seconds with normal pointing and falling reactions.

Case 4.

R. A. F. Can. 153120—After 14 hours' dual, this Cadet was allowed to fly alone and did 30 hours before being referred to the Medical Department for Vertigo, particularly on looking over the side of the machine. He had no nausea or vomiting in the air, nor after the turning reactions, which as far as pointing and falling reactions were concerned, were normal, but the test showed Nystagmus to the right 42 and to the left 44 seconds.

On the other hand, a certain group of Observers believe that the less sensitive a man is as shown by these reactions, the better pilot he should make, since theoretically he would then be less subject to air-sickness.

The arguments used against this belief are based on the fact that the less sensitive pilots would be unable to utilize to the fullest extent those stimuli received from the semicircular canals which contribute to the maintenance of equilibrium.

An interesting case in point is that of an applicant whose nystagmus time to right and left was 12 and 14 seconds. Theoretically, from this point, he should have made a good balloonist, but on turning, he had marked vertigo, became dazed and completely collapsed. His pointing tests were confused and on turning to the right, he fell to the left and vice-versa.

Another is that of R. A. F. Can. 152522, who showed 17 seconds to the right and 16 to the left, confused pointing and terrific falling, nausea, vomiting and collapse on turning. This Cadet had 16 hours in the air and suffered from vomiting. There was a history that he had crossed the Rocky Mountains 6 times, each time having fainted and bled from the nose.

One case of Spontaneous Nystagmus was encountered (R. A. F. Can. 170115). It was found that this candidate showed Spontaneous Nystagmus on turning the eyes either to the right or to the left. After rotation the oscillations persisted for 75 seconds to the right and 50 seconds to the left. The pointing and falling reactions were normal.

A few professional "Whirling Dancers" presented themselves for examination. These men all showed normal past-pointing and falling reactions insofar as the direction was concerned, but in every case, the past-pointing was slight and transient and the applicants sat almost upright in the chair after rotation. The after-turning nystagmus times of these six cases were as follows:

Case 1	R. 10	L. 14
Case 2	R. 16	L. 12
Case 3	R. 10	L. 11
Case 4	R. 9	L. 11
Case 5	R. 10	L. 21
Case 6	R. 28	L. 24

It would seem from the above that persistent and rapid rotary movements of the body have a tendency to reduce nystagmus time, but in view of the limited number reported, I do not consider that any deductions should be drawn from this group.

A certain amount of research along this line has been carried out in the United States, the results of which will be found in the American Air Service Medical Manual.

One series of cases was reported in which as a result of turning a small group of men ten times each day for a period of some six weeks their nystagmus time was both appreciably and progressively reduced.

On the other hand, another group of observers rotated a number of subjects for a similar period of time and report that no change whatever took place in the duration of their nystagmus. In the latter group, however, it should be noted that the number of rotations per diem was not stated, but it is presumed from the context of the report that only one turning was done daily.

It would seem reasonable to presume in view of the above reports that fatigue, to some extent at least, may reduce the period of after-rotation nystagmus.

Again, it may be interesting to note that experiments in vacuum chambers, apparently show a definite reduction in the period of nystagmus time after rotation at low oxygen tensions. A series of experiments were also carried Out in the vacuum chamber at similar altitudes which showed that the periods of reaction time were considerably lengthened, which result would naturally be expected.

A number of cases of definite asymmetry in the nystagmus periods on the two sides were encountered among R. A. F. pilots who had no examination at attestation, the following being examples in point:

Case 1.

R. A. F. Can. 74317—This Cadet was given 6 hours and 15 minutes' dual after which instruction was discontinued on account of vertigo and faintness in the air accompanied by headaches after flying. He showed nystagmus of 20 seconds to the right and 35 to the left. His pointing tests were slightly confused, but the falling was normal.

Case 2.

Lt. A. R. S.—This Officer had done some flying as an Observer in France and was sent to Canada for training as a Pilot. He complained here of marked nausea and vomiting in the air, and was in addition a neurasthenic. His nystagmus to the right was 34 and to the left 50 seconds. It was impossible to complete his tests on account of sickness in the chair.

Case 3.

R. A. F. Can. 74966—This Cadet had 6 hours and 4 minutes' dual and some 20 hours' solo flying. His Instructor reported that he had "poor sense of balance" and marked tendency to side-slip. On this account, he was referred for examination, when it was found that although his pointing and falling reactions were normal, his nystagmus to the right was 33 and to the left 18 seconds.

Case 4.

R. A. F. Can. 153230—After 9 hours and 30 minutes' dual and 5 hours' solo this man was referred on account of nausea and vomiting in the air. It was found that his falling reactions were normal, his past-pointing was confused and the nystagmus to the right 26 and to the left 18 seconds.

Case 5.

R. A. F. Can. 153642—This Cadet had 15 hours' dual and 20 hours' solo and was referred for vertigo in the air. His falling reactions were normal, his pointing slightly prolonged and his nystagmus to the right 25 and to the left 28 seconds.

It would seem, in view of the above cases, that no man with asymmetry in his after-turning nystagmus should be allowed to pilot a machine, certainly not until after a most exhaustive medical examination shows an absence of any physical defect, and practical proof is produced, after trial flights, of his comfort under all conditions in the air.

While it is necessary that Pilots have an acute and accurate sense of balance, the same does not apply to a like extent to Observers, for even should an Observer fail to come within the arbitrary limits set for Pilots, providing that he experiences no nausea or vomiting in the air, and does not become dizzy on "stunting," there would seem to be no reason for rejecting his application, providing, of course, that he is physically sound. These latter remarks may also with reason be applied to balloonists or the crew of an airship.

The relation of seasickness to functional disturbances of the semicircular canals is apparently very close. Since it is well known that the canals lying in

the vertical plane are more sensitive than those in the horizontal, it has been suggested that individuals susceptible to seasickness during the rolling of a steamer lie in the long axis of the boat, and during the pitching motions in the opposite direction, for the reason that the vertical canals will thus be less affected.

It is interesting to note that it was observed at the Recruiting Office that on certain days an abnormally large number of applicants for pilots were rejected on account of nausea and vomiting on confusion in past-pointing, and that an investigation into the condition revealed the fact that these days coincided with the arrival of drafts from distant recruiting centers.

It was found that if a very large majority of these men were given from 24 to 48 hours' rest, and then rotated that they were able to pass a normal examination. It should be noted here that the rest had practically no effect on the duration of their after-turning nystagmus, and in no case was there a variation of more than five seconds on the different days.

It would seem that, in view of the above facts, no pilots who have just completed train journeys should be allowed to resume flying for at least 24 hours, unless their rotation tests show perfectly normal reactions and absence of nausea and vomiting. The same remarks apply to travel by sea.

The disturbed reactions, in my opinion, are probably the result of a certain amount of auto-intoxication resultant upon the constipation and disturbance of the digestive system which so frequently accompanies travel by rail or boat. It is possible, however, that it may result from the continuous and irregular vibratory movements of the railway carriage being communicated to the endolymph, to the effect of the unusual motions experienced on shipboard on this same fluid, or perhaps to afferent stimuli received from the eyes resulting from the nystagmus observed in individuals looking at the passing scenery.

During the earlier months of the application of the Barany Tests in the Royal Air Force, Canada, comparatively little stress was laid on the occurrence of nausea and vomiting at the time of turning. Later, it was found that a number of applicants who showed marked sickness at the time of the original test developed nausea and vomiting while flying. In view of this fact, it would seem inadvisable to accept applicants who show marked disturbances after rotation, particularly if an element of collapse accompanies it.

It was first considered probable that these men would get used to the unusual stimulation in the same way as the majority of individuals do to the motion at sea, but after it was found that some of these accepted men were being returned from the flying wings on account of aerial sickness, our attention was directed to this point, and as a result, thereafter no candidates were accepted who showed repeated nausea and vomiting to any degree after rotation.

But while nausea, vomiting and vertigo in the air are frequently seen, they are not necessarily associated with vomiting or nausea at the time of Rotation Tests.

It was quite common to find Cadets exhibiting temporarily a minor degree of Air Sickness, who, after several flights, became completely used to the motion. These cases were not, of course, referred to Headquarters, provided that their Turning Tests were known to be normal and it was found at the "Wings" that they were physically sound.

It is interesting to note that excessive coffee drinking was responsible for a very considerable number of complaints, chiefly minor degrees of vertigo and nervousness. These, of course, completely cleared up on rational treatment.

It should be pointed out that in a number of cases it is noted that leave was granted. In addition to this, general instructions as to diet, hours of sleep, smoking, etc., were given, and usually a course of eliminative treatment as well was carried out during this period.

The three cases found to have discharging ears had perfectly normal reactions.

A final summing up of the relationship between Vertigo, Nausea and Vomiting in the air and disturbances in the chair would seem to indicate that while there is no constant relationship between them, yet, in view of our experience, it would seem inadvisable to allow any pilot to fly who exhibited nausea or vomiting to any extent in the chair, and also that immediately on the appearance of Air Sickness, pilots should be temporarily prohibited from flying and only allowed to again fly solo after test flights in a dual machine.

The general physical condition of an applicant may have a definite effect on Past-Pointing and Falling Reactions, but more particularly on the former. The after-turning Nystagmus, however, unless there is definite fatigue or actual organic lesions is usually not affected.

The cases already referred to which were encountered following train and boat journeys are examples in point.

Those noted below are inserted for the purpose of showing the necessity of a repetition of the Turning Test after illness.

Case 1.

R. A. F. Can. 153183—On attestation, Nystagmus to the right was 29 and to the left 31. Past pointing and falling were normal. This man was admitted to Hospital for Bronchitis and suspected Tuberculosis, and shortly after his discharge two months later, was referred for further examination on account of Nausea and Vomiting in the air, during a period of 4 hours and 30 minutes' dual flying. It was found that his Nystagmus to the right had risen to 37 and to the left 46 and that it was impossible to complete the Turning Tests on account of marked Nausea and Vomiting.

Case 2.

R. A. F. Can. 153905—This Cadet on attestation showed Nystagmus to the right of 24 and to the left 25 with all other reactions normal. He developed Influenza and after one hour and 35 minutes' dual, was referred for examination on account of Nausea and Vomiting in the air. It was found that his Nystagmus

time was practically unaltered, but that his Pointing to the right and left was confused to the point of cross-pointing and that he fell in the wrong direction both after turning to the right and to the left. Marked Nausea and Vomiting were also noted at the time of turning.

Case 3.

Lieut. W. N. P.—After 200 hours' flying in France, developed Nausea and Vomiting in the air and for that reason was given Leave to Canada. His Nystagmus time was normal he showed no falling after being turned to the right and had marked Nausea and Vomiting at the time of Turning Test.

Case 4.

Lieut. C. J. D.—This Officer, after 300 hours' flying, began to complain of Nausea, Vomiting and Vertigo in the air; also that he had lost sense of orientation in turns. His Nystagmus to the right was 30 and to the left 35. His Past Pointing was markedly confused, with wrong falling on rotation to the right. There was also marked Nausea.

It is presumed that the Officer above mentioned would have shown normal turning tests on attestation.

It is well known that certain toxæmias have a definite effect on the central nervous system and the labyrinth of the internal ear. One outstanding example is that of Lues which attacks very early in its course the terminal filaments of the 8th nerve. Apparently, the poison having a selective action.

It should be noted that certain cases of this disease have been detected, and the diagnosis confirmed by means of the rotation tests. The usual effect of this particular toxin is to lessen the period of after-turning nystagmus. Other diseases undoubtedly have a similar effect, but as yet sufficient data are not at hand to warrant the drawing of any definite conclusions.

From the viewpoint of the Air Force, the knowledge that Lues attacks the internal ear is of extreme importance, for it is obvious that a man so affected should not be allowed to fly until his treatment is completed, and then only after exhaustive tests showing the absence of any labyrinthine disturbance, not only for the reason that his equilibrium might as a result be disturbed, but having in view also the possibility of a drug toxæmia developing as a result of treatment, and interfering with the normal action of the canals.

In conclusion it would seem that the semi-automatic maintenance of aerial equilibrium depends, not on the information derived from any one set of peripheral sense organs, but on the correct interpretation of afferent stimuli arriving at the cerebral centers from widely different sources, their correlation and proper utilization in conjunction with the sense of judgment resulting from the pilot's experiences.

NOTE.—Owing to lack of space charts and appendices had to be omitted from this article.

THE DIAGNOSIS OF ACUTE INTUSSUSCEPTION *

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In the progress of medicine of late years, much stress has been laid upon the employment of special methods of diagnosis. The X-Ray and the laboratory have been of inestimable benefit in furnishing us with additional and sometimes most accurate data upon which to base a diagnosis, and by which to measure the benefits of treatment.

While all this is most valuable and necessary, there is the danger of our becoming too dependent upon artificial methods. There is just as much reason to-day as there was twenty-years ago for making a detailed examination of our patient, and for making a careful analysis of his signs and symptoms in order to arrive at a correct conclusion as to the pathological conditions underlying them. There are still many conditions wherein we have to depend solely upon the knowledge our eyes, hands, ears, and nose bring us in the routine examination of our patients, in order to arrive at a correct diagnosis.

One such condition met with most frequently in infancy, with which we are all theoretically familiar, is Intussusception; yet there is no condition overlooked so often by the average practitioner. Moreover, there is no condition wherein, failure to make an early diagnosis may be fraught with more disastrous results.

Analyze any series of reported cases; read any monograph by any experienced observer, and you will find that as the period of time between the onset of symptoms, and the institution of radical treatment lengthens, so does the death rate rise. It is not the purpose of this paper to discuss the treatment—that duty devolves upon the surgeon, but according to the results of treatment can we measure the importance of early diagnosis. Surgeons all tell us that the mechanical difficulties of reduction are greatly increased, the longer the Intussusception remains unreduced. Toxic symptoms less frequently manifested in the first eighteen to twenty-four hours are most dangerous, and of serious importance in the great majority of cases after twenty-four hours.

When a case has remained undiagnosed, and consequently untreated too long, simple reduction becomes impossible, and the bowel must be resected. Even when reduction has been successful the child may die from the toxæmia. In my own experience I cannot recall a single instance of a child, under one year of age who recovered from intestinal resection for intussusception.

As you may know fully one half the cases occur between the ages of four and ten months.

Note.—*Presented before the Ontario Medical Association, May, 1920.

(1.) Dr. W. E. Gallie has given me some figures he published in 1916. In an analysis of 45 cases, there were 16 recoveries and 29 deaths. Of the 16 recoveries, 12 received treatment within the first twenty-four hours. Of the 29 fatal cases, 24 did not receive treatment until after twenty-four hours had elapsed. In two of the fatal cases, the gut was gangrenous, within twelve hours of the onset of symptoms. These few figures alone are sufficient to show the utmost importance of early diagnosis, in order that radical treatment may be instituted at once.

The general physician to whom practically all these children are brought in the first instance, has the full responsibility of recognizing the condition. It is incumbent on him therefore in all suspected cases, to examine the child thoroughly, and to weigh carefully the signs and symptoms, individually and collectively, in order that he may decide at once the presence or not of an intussusception.

The typical well marked case should never be missed; yet this is the one most frequently overlooked. Once the suspicion of an intussusception enters the physicians mind, he will soon find evidence to justify or negative the diagnosis.

As most of the children affected are between the ages of four and ten months, it follows that a large proportion of them will be breast-fed infants. As a matter of fact the victim is usually a well developed hearty boy. He has been perfectly well, having neither diarrhoea, nor constipation, when he is suddenly seized with acute pain.

The degree of pain varies greatly in severity, usually it is sudden, sharp and colicky in character. The intussusception acting as a stimulus irritates the nerve cells of the bowel wall, and provokes increased efferent impulses down the vagus. There results a strong contraction above the point of stimulation. This powerful contraction of the gut is the cause of the pain. If the obstruction at this point is complete, the pain will persist intermittently until the obstruction is relieved.

The pain does not persist very often early in intussusception. Either at first the obstruction is not complete, and the contractions are successful to a degree in forcing onward flatus and intestinal contents, or else a rapid swallowing of the invaginated portions of the gut minimizes the resistance to the contractions. Certainly it is so, that after the initial attack of pain, the baby though not entirely comfortable drops off to sleep. The pains recur when he wakes up, and is given food. The stimulus of food in the stomach reflexly increases peristalsis. By this time too the intussusceptum has probably travelled a considerable distance down the gut, and swelling and congestion of the bowel walls have completed the obstruction. Then does the pain recur intermittently and colicky in character, until either the obstruction is relieved, or the effects of toxæmia secondary to obstruction, have so increased the influence of the sympathetic impulses over those of the vagus that peristalsis has become inhibited.

The relation of toxæmia to intestinal obstruction has been worked out by Whipple and others.

(2.) In their experimental work upon dogs, they closed off a loop of duodenum. They then prepared a fluid from the mucous membrane of this loop, which they injected intravenously into healthy dogs. These animals died within a few hours with all the symptoms of acute intestinal obstruction. At autopsy the mucus membrane of the bowel was found to be deeply injected and covered with bloody mucus.

This probably explains the fact that late in untreated cases of intussusception the intermittent pains cease. The relation of this pain of a particular character to the vomiting, I believe to be an important point in diagnosis. In obstruction, the vomiting always follows the pain. As mentioned before, the baby after the initial attack of pain will frequently drop off to sleep. When it awakens and is given food, the pain recurs and then vomiting ensues. Early vomiting indicates early obstruction. That the pain is not always immediately followed by vomiting, and that sometimes the vomiting, although the baby is taking his food well, is delayed twelve to sixteen hours, would indicate that up to that point, obstruction was not complete. The vomitus at first consists of stomach contents only. Later it is colored by bile. In infancy one does not find a fecal odor to the vomitus, as noted in older children and adults. When it does occur it does not indicate the regurgitation of feces. Albuminous putrefaction occurs above the point of obstruction with the liberation of indol and skatol. This material flowing backwards to the stomach, either through reversed peristalsis or persistence of the axial stream, gives a fecal odor to the vomitus.

Intermittent colicky pain followed by nausea or vomiting, does not indicate intussusception. It indicates obstruction. The same symptom complex may result from the blocking of such viscera as the gall bladder, the pelvis of the kidney, the urinary bladder, the appendix or any part of the gastro-intestinal tract, or even a softening and enlarging mesenteric gland. But if it occurs suddenly in a healthy baby intussusception should be strongly suspected.

The general appearance of the baby after the initial attack of pain is usually very characteristic. Even though apparently comfortable, there is a degree of prostration altogether out of proportion with the symptoms so far manifested. The baby may be almost torpid, the abdomen lax, the temperature low and the pulse feeble and rapid. The face is pale and perspiring and the expression is anxious.

This appearance is not peculiar to intussusception; it may accompany any acute abdominal condition, but its sudden appearance and persistence following an attack of acute pain in an otherwise healthy infant is again strongly suggestive of intussusception.

Another symptom of intestinal obstruction is constipation. Although soon after the onset of symptoms a motion may be passed emptying the bowel below

the site of obstruction. Subsequently there is no more escape of *fæces* or *flatus*. There is then absolute constipation.

Pain, vomiting and constipation are symptoms of intestinal obstruction. The escape of blood and mucus from the rectum, eliminates all factors other than some very acute condition as the cause of obstruction. The most common of such acute conditions in children is intussusception.

The blood is a bright red in color, and is passed usually in small amounts alone or streaking small quantities of clear white mucus. Sometimes it is late appearing. The higher the obstruction the longer it is in making its appearance, or it may not be passed voluntarily at all when the toxaemia is sufficient to inhibit peristalsis. In such a case when a rectal examination, which should be a routine procedure in all cases, is made, the withdrawal of the examining finger is followed by a slight gush of clear mucus and blood. It is unmixed with *fæces* and moreover is not bile stained. Unless the intussusceptum fills up the lower part of the bowel, the examining finger finds the rectum rather distended, and as Dr. Gallie (1) has pointed out, there is a feeling of emptiness in the right lower quadrant. Another point of interest is that when one is about to make a rectal examination, the child may be crying with pain. With the passage of the finger through the anus, the crying ceases and the child appears temporarily comfortable.

The passage of blood and mucus either voluntarily or in response to such a stimulus as a rectal examination, is so characteristic, that it must be considered as evidence of intestinal obstruction, which in a baby means intussusception.

Blood is sometimes passed per rectum in other pathological conditions of the baby's bowel. This accounts for some of the tragedies that have occurred. The physician has forgotten, or wilfully deceives himself as to the possibility of intussusception, and wastes valuable time hoping to relieve the condition by palliative treatment.

It has been claimed that the blood escapes in to the lumen of the bowel owing to the interference with the circulation in its walls. This of course is possible. But Whipple's work (2) makes it more probable that a lesion has been produced in the mucous membrane of the gut by some fixed toxin, which is accountable for the appearance of blood and mucus in the canal.

The passage of blood and mucus per rectum following an attack of acute pain and vomiting and associated with constipation must be sufficient justification for immediate radical treatment even if no tumour can be palpated in the abdomen.

The finding of the typical cylindrical tumour, with a slight concavity towards the umbilicus, combined with the above symptoms and signs confirms the diagnosis of Intussusception beyond peradventure. It is elastic, and may be found any place in the abdomen, but it is usually situated somewhere along the course of the large intestine. Its concavity is due to the pull of the mesentery, as it becomes invaginated along with the bowel. Sometimes it is quite difficult to

find. It may be tucked up under the liver. The resistance of the baby to palpation or the distension of the bowel above the obstruction may make a satisfactory examination impossible. In any case of doubt, an examination under anesthesia is indicated when the tumour will be found.

Where there has been a particularly mobile cæcum and ascending colon due to the persistence of a mesentery, the intussusception may travel rapidly downwards until it reaches the rectum. Cases have been reported where the apex of the intussusceptum protruded through the anus. This should never be confused with simple prolapse of the rectum. In this condition the examining finger will pass at once from the mucous membrane of the tumour to the skin of the anus. In intussusception the finger can be passed in a groove for some distance into the rectum around the presenting tumour.

Again the position of the abdominal tumour may vary from hour to hour, as the contractions of the bowel force the intussusceptum farther down its lumen.

Among the conditions which conceivably might be confused with intussusception are:—

Tuberculosis of the cæcum—not often encountered in this country. In this condition the tumour is fixed in size and position in the ileocecal region. There is as a rule incomplete obstruction so that the pain is less severe and there is no vomiting. The blood passed per rectum is more profuse, and is from time to time mixed with faeces.

Henoch's Purpura has also been mentioned as difficult of differentiation. This is probably not so. There may be abdominal pain due to muscle spasm induced by haemorrhage and oedema in the wall of the gut, and there may be blood passed per rectum, but there is not obstruction. Faeces appear from time to time with the blood; moreover there are usually other evidences of purpura such as joint pains and the typical skin eruption. The real difficulty is to decide when an intussusception supervenes upon Henoch's Purpura. The swollen segment of bowel may become the starting point of an intussusception. However the added symptoms and signs of obstruction mentioned above should be sufficient to recognize this complication. In any case of doubt laparotomy should be performed.

Still (3) reports a case where the diagnosis lay between scurvy and intussusception. The baby looked extremely ill, was passing blood and mucus through the rectum and had a sausage shaped tumour in the region of the transverse colon.

However there were evidences of scurvy elsewhere, faeces occasionally appeared with the blood so no radical treatment was undertaken. Under antiscorbutic treatment the child recovered. In this case the resemblance to intussusception was marked. The tumour which was due to submucous hemorrhage in the transverse colon, did not vary in position or size, and there was no obstruction.

Infectious Diarrhoea should not be mistaken for intussusception. In this condition the onset is not so abrupt. There is a higher degree of temperature and usually loose frequent motions for one or more days before blood appears in the motions. Examination of the stools in a case of infectious diarrhoea when blood appears usually will reveal pus also. This is in marked contrast with the clear mucus with the blood in intussusception. Again in infectious diarrhoea, one can sometimes find particles of faeces in the stool. There is a fecal odor and the color of the motion may be yellow, green or yellowish green owing to the presence of bile pigments. These pigments would of course be absent when the obstruction was below the opening of the bile duct into the bowel.

Here again the real difficulty is met with when intussusception supervenes upon such a condition. Then, one must be guided by the symptoms of obstruction, that is the disappearance of faeces and bile pigments from the bowel discharges, and the occurrence of intermittent pain followed by vomiting. The child may have had vomiting and pain before, but there is not the definite relationship of the vomiting to the pain as occurs in obstruction from intussusception.

The healthy lusty baby boy, who has a sudden attack of abdominal pain, intermittent and colicky in character and followed by nausea or vomiting, has an obstruction to some abdominal viscus. The prostration and the perturbed pallid, perspiring face, are entirely disproportionate to the symptoms exhibited. The occurrence of absolute constipation locates that obstruction in the bowel. The escape of blood and mucus from the rectum, indicates that toxæmia following the obstruction has produced a lesion of the mucous membrane. In a baby this is strongly presumptive evidence of intussusception, and with the symptoms just mentioned, justifies a laparotomy. The discovery of the characteristic tumour in the abdomen either by external or bi-manual examination completes and establishes the diagnosis of acute intussusception.

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GENITO-URINARY INFECTIONS*

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Modern medicine and surgery is a combat against infection. The term has perhaps a varying significance, dependent upon certain obscure factors in disease, but the general principle is the same. In the ever changing evolution of medical science this epoch seems to possess so many irrefutable proofs of infection causing disease that the question is beyond doubt. Ancient and earliest medicine recognized the "Humors" in the blood and tissues. Modern Medicine not only recognizes the toxins in the blood but the bacteriological causes of the same. Here perhaps today we are apt to overlook entirely the predisposing causes of disease and fail to appreciate the real importance of the changes that take place during the processes of metabolism and katabolism. Medical science now is only beginning to study these processes in a scientific manner and it would seem that the studies should later enable us to scientifically tell not only why these infections probably take place but also correct the errors in metabolism that make the human body a suitable culture media for germs producing pathological conditions whose natural habitat may be the body.

One wonders sometimes how far we have advanced beyond the blind empiricism of ancient medicine. Certainly it is that we surely are able more intelligently and scientifically to diagnose our cases, but with our increased scientific and bacteriological knowledge our prognoses are not so full of promise for cures, and thus the faith of patients in medical science is somewhat shaken and such cults as Christian Science, Chiropraxy and Osteopathy flourish because their adherents without any scientific knowledge can promise so much. Our medical epoch, therefore, is one of critical importance, for if we are breaking down the empiricism of the past with respect to medical results then we must be able to replace this with some tangible evidence of the results of our advanced scientific education, lengthening the "Span in the bridge of life" or at least making the crossing more healthy. We then must with our increased bacteriological knowledge be able not only to prevent these infections as well as alleviate the results of the same. Then, necessarily one of the most important factors in accomplishing this is the early recognition of these infections as well as a scientific knowledge of their sources, pathogenesis and consequences.

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Now, what is true of general infections is also true of urinary infections. Since the perfection of the modern cystoscope, much progress has been made in the study of the causes, progress and final results of these infections and that the early recognition of their varying features is important, is evidenced by the disastrous results so frequently seen following them. In the study of them, one is impressed with the many external or predisposing causes that play an important role in bringing about their introductions, and regulating their virulence and varieties. Of these should be mentioned:—

1. Causes that lower the general systemic resistance such as trauma, over exertion, mental or physical, over indulgence or exposure to colds.
2. Systemic conditions by which there is absorption of, or delay in, the proper function of the alimentary canal.
3. Inflammatory conditions either in the urinary system or in contiguous areas that interfere with natural urinary drainage.
4. Anatomical malformation, displacements or embryological defects, or concretions that cause a urinary stasis.
5. Excretory products of metabolism which during excretion may set up a urinary irritation.

Of the predisposing causes met with those that cause a stasis in the urinary system seem to play the most important role whether such retention is an acute temporary one or a partial retention extending over some time. How frequently one notices a cystitis following an acute retention after an operation or in the acute diseases. Whether the cause is due to a lack of muscular tone following the distension which may leave residual urine or whether by the stretching of the epithelium of the bladder mucosa an infection penetrates more easily, is difficult to explain.

But the more gradual retention of the urinary excretion by a continued partial stasis or a residual content unfolds a picture that up to the present has not been fully appreciated. Here we have a condition that is often long overlooked but nevertheless serious because it not only effects the urinary system interfering with its proper function but also by upsetting the natural equilibrium of the other bodily functions. Of the more common conditions producing stasis from above downward should be mentioned displaced kidney, renal pelvis block, twists or kinks in the ureter, vesical growths, either per se or by position, prostatic enlargement, median bar, stricture, and atonic muscular condition.

You will notice I have not mentioned calculi because to me it is very difficult to understand how calculi can form in the urinary system from an error in metabolism only, when we can so often follow the formation of a vesical stone with the cystoscope after infection has been definitely established. One wonders whether these calcareous deposits may not be the accident in sub acute or chronic inflammatory processes, just as a gall stone is said to be the accident in chronic cholecystitis.

When we come to study the methods of the spread of urinary infection, we find that numerous articles have been written as to whether these infections are ascending or descending, or in other words, whether the upper tract is infected from the lower tract or through the blood stream. Certain it is that if the upper tract is infected the lower is necessarily likely to be to a greater or less degree, hence the descending method is recognized. Then again, are the upper infections hematogenous or urogenous. At one time the urogenous source was given greatest prominence and upper infections took place in two ways:—

1. By the lumen of the ureter.
2. By the lymphatics of the ureter.

Regarding the first, Brasch has very often shown the value of the normal valvular action of the vesical segment of the ureter preventing the regurgitation upward of the bladder contents, but under back pressure conditions, undoubtedly an infection can travel up the ureter and probably only when there is back pressure. Hence every case of cystitis should be examined for urinary stasis not only to facilitate better drainage but also to prevent an infection extending upward. As to the second method or lymphatic spread upward by the interstitial lymphatics of the ureter, Ersendrath and Schultz seem to have well established the fact by their experiments, which show that a gradual extension upward of the infection could take place not only from the bladder but also from the pelvic organs of the female and lower intestinal tract. On the other hand, if the lymphatic area becomes involved, especially around the bladder, may not the general lymphatic drainage into the blood stream have to be considered as suggested by Kaufman (New York)? Today much more prominence is given to the hematogenous source of these infections, in the upper tract especially. Reasonably, if we believe in chronic foci infection in various parts of the body infecting the blood stream, it would seem that the renal system would be one of the most likely to take up infection. Undoubtedly, in health, the kidney filters the bacteria without apparent injury, but the retention of the bacteria in the kidney produces trouble. When one remembers that the cortical part of the kidney is the arterial side and that this part handles the infection in the blood stream by its filtering process then it would seem that a hematogenous source must be the most likely of all, at least in the cortical area and especially so of the cocci infections. In summing up the methods of infection it would seem that urinary stasis favors an infection in any part of the system probably of a hematogenous source, while the upper tract may also be infected through the lumen of the ureter or by upward lymphatic extension. Direct infection probably only takes place in the presence of trauma and even then it would seem to be aided by circulatory changes.

When infection does take place it is only necessary to mention the usual condition that can arise in the urinary system. In the upper we have pyelitis, pyelonephritis, pyonephrosis, renal and peri-renal abscess with ureitis and pyo-ureter. In the lower tract cystitis, prostatitis, ureteritis and pyo-ureter.

In the lower tract cystitis, prostatitis, urethritis with its adnexa and seminal vesiculitis and epididymitis. On the other hand a number of the more common diseases that result from these infections are: nephritis, arthritis, myositis, neuritis, myocarditis, iritis, etc. No other system of the body anatomically or physiologically possesses so many obscure area for foci deposits as the urinary system, so if we are going to recognize the fact of infection from localized foci causing many diseases, then we must accept the responsibility of these foci. It is not within the scope of this paper to discuss all the various organisms which may occur in these infections but only to treat of some of the most common producing inflammatory conditions. That a bacteraemia or bacilluria may exist with few active symptoms and with apparently spasmodic recurrences must be admitted.

The most common organism of all is the colon bacillus especially so in the upper tract while the gonococcus is most prevalent in the urethra and its adnexa usually, however, accompanied with other organisms. When acute, the colon bacillus infection of the upper tract is often bilateral and sets up very marked symptoms but the sub acute or chronic variety often show more or less vesical symptoms and a diagnosis can only be made by means of the cystoscope and urethral catheterization. Many of the sub acute and chronic cases follow on the acute condition, for while undoubtedly many of these acute cases apparently improve with treatment yet one is amazed at the persistence of infection in the renal pelvis, as pure cultures of the organism can often be found after pelvic lavage even of strong silver solutions. This is probably explained by the fact that a pure pyelitis seldom exists without some pyelonephritis as the colon bacillus apparently makes a selection of the urinary straight tubules. Often these patients when seen in their exacerbation present the symptoms of an ordinary influenza and unless attention is drawn to the urinary system by vesical system and an examination made of the urine, may be diagnosed as such. As you know, a colon bacillus pyelitis is very common in pregnant women, usually beginning about the fourth month but may occur at any month of after parturition and when doing so may be mistaken for a puerperal septic infection. Young children also suffer even in the early months of life from an evident colon bacillus pyelitis and this is often as in adults preceded by some intestinal disturbance or some rectal operation or irritation. In the sub acute and chronic cases a diagnosis may often be suspected by a characteristic appearance of the urine which Thompson Walker describes as the "bacterial emulsion" being hazy in appearance and when rotated in a glass breaker so as to circulate the urine, resembles cigarette smoke. The reaction is usually acid, often neutral and seldom alkali. Colon bacillus may invade primarily any part of the urinary system and much more prominence is given to its action in the male often being responsible for some of the obscure conditions with reflex symptoms that arise in the genito urinary system. Once the infection takes place, the patient is liable to suffer

from reinfections or recurrences which may be explained by the fact that the nidus is present in the renal pelvis of the female and in both the renal pelvis and the prostate in the male. Much work has been done to determine, if possible, the normal limit of alkalinity or acidity detrimental to the growth of colon bacillus and also with the use intravenously of certain chemical products to produce continued urinary antisepsis but the clinical application has not so far been fully worked out.

Tubercular Infections. The tubercle bacillus is usually in the kidney and secondary to some other foci in the body and is hematogenous in its method of infection. It illustrates best of all the usual methods by which infection can spread in the urinary tract being hematogenous in origin, descending along the ureter to bladder involvement secondarily and later may attack the other kidney by the ascending method probably by the lymphatic spread upward. Today tuberculous infection of the kidney is usually advanced before a diagnosis is made which should not be the case. The early symptoms are usually vesical only, just as the more marked later symptoms are vesical. A nocturnal frequency in a young adult should make one as suspicious of tuberculous infection of the kidney as a nocturnal frequency in a man of 50 years makes one suspicious of hypertrophy of the prostate. Early diagnosis to my mind means even more in the urinary system than in the pulmonary system for today only the most radical measures can prevent the progress of the disease and even after these measures the vesical symptoms will often persist for some time. It is true one can never estimate the amount of involvement in the kidney by symptoms. In one of our earliest cases, because of the absence of marked symptoms, very good function being proven on the affected side, the surgeon, with apparent good judgment thought a resection of the kidney might be attempted. On section it was found necessary to complete the nephrectomy and the patient suffered from a tubercular infection of the wound which required weeks to heal due to the attempted resection. At first these infections are usually unilateral but allowed to go on become bilateral. Early diagnosis is then of paramount importance as the success of any surgical measures that may be attempted depends on the function of the other kidney which is most likely to be sufficient if not subjected too long to the infection while the unfortunate patient will be saved a great deal of suffering that no medical aid can adequately relieve.

In the study of cocci infections, alone or mixed in the urinary system, we find very much up-to-date interest both to the urologist and the internist. Undoubtedly in the past many cases that have been diagnosed Bright's Disease are localized focal infections, often only unilateral and when the source of the infection is removed, the renal symptoms as discovered by urinalysis clear up. Staphylococci infections are next most common after the colon bacillus and are often associated with colon bacillus especially in the lower tract. Both staphylococci and streptococci possess certain common characteristics. In the upper tract these infections are frequently uni-lateral usually hematogenous the result

of foci of living organisms and secondary to pyogenic foci in other parts of the body. Of the most common sources may be mentioned, teeth, tonsils, boils, carbuncles, gall bladder, duodenal ulcer, etc. The symptoms in the renal area unless acute are often not marked, often only vesical, if acute, however, may be those of profound toxæmia. One symptom we have observed in our clinic fairly commonly is hæmaturia with no accompanying symptoms other than macroscopic blood in the urine and here we have undoubtedly an explanation in many cases of what was, and is still, described before the advent of the cystoscope as "essential or idiopathic hæmaturia." This symptomless form of hæmaturia usually disappears by the removal of the localized foci outside of the urinary system. Cabot and Crabtree in 1916 showed that these pus cocci are deposited in the cortex of the kidney and tend to work toward the periphery while the colon bacillus involves the collecting tubules of the pyramids and extends from there to the pelvis thus causing pyelitis.

In a paper read June, 1919 and published October, 1919 Dr. W. J. Mayo claims that this form of cortical infection of living organisms is a true nephritis and sometimes has been confused with Bright's Disease. To quote he says "hematogenous kidney infection is the one bright picture in a group of maladies that have been discouraging in the extreme." The surgeon of today is as greatly interested in nephritis as the internist. Mayo also claims that he has been able to trace an interesting sequel in these infected areas in which are deposited calcium carbonate usually close to the capsule which casts a shadow resembling stone in the kidney substance. Apparently these deposits take place as a process of cure of the infection. From these cortical infections we also have a cause of perinephritis abscess, the pyogenic organism penetrating the kidney capsule and infecting the area beyond,

Streptococci infections either alone or associated with other organisms are the most virulent forms of infection. When occurring in the kidney area they are often of the fulminating type and so severe that unless surgical relief is given usually by nephrectomy the patient dies within a few days. Nephrotomy is usually followed by severe and continued hemorrhage. In sub acute or chronic form these infections appear in the kidney the result of emboli. In the bladder the cocci infections occur alone or with the colon bacillus and when they do, are usually the cause of a more intense cystitis, especially the streptococci.

When we come to discuss infections in the lower tract or in the urethra and its adnexa no part of the body contains so many areas that may contain these foci latent or otherwise. With our present day knowledge of these infections and our increased knowledge as to methods of treatment, I am not sure which to deduct, whether we are clearing them up better or only learning that there are many we do not clear up. One thing is certain, that of some of these patients it can be said, once infected always infected in both the male and the female whether these foci show pathological conditions or not. I am more and more convinced that glibly answering in the affirmative the queries of these patients as to being cured or not has automatically made more of our profession

members of the "Ananias Club" than any query answered. As you know the gonococcus is responsible for many of these infected conditions but this Neisserian entity seems to have the faculty of "blazing the trail" for the other infections we have been discussing, namely, staphylococcus, streptococcus and colon bacillus that apparently have a tenacity for life, long after the gonococcus is dead or at least buried. Now these foci of infection can be more or less latent perhaps for years and not set up any symptoms of note while on the other hand they undoubtedly account for many chronic diseases of the rheumatic type. If pyogenic organisms in the teeth, tonsils etc., can set up these chronic conditions it is reasonably assumed that they may do the same when in other areas of the body. That being so, there doubtless are many who have lost their teeth and tonsils even in the presence of suspected infection and gone on with a much greater foci in their genito urinary system. When these infections take place one is often struck by the marked systemic as well as local symptoms that occur and if these infections occurred in easily accessible parts of the body they would be subjected to the ordinary surgical technique of infection viz., drainage. The effect of drainage in some of the chronic cases with arthritic symptoms has been well shown by Dr. Eugene Fuller in 1910 by improvement in the cases as well as demonstrating the active organisms in the part drained. That infection of the urethra and its adnexa by these organisms occurs without a gonorrhoeal attack is also true for one often finds pus and bacterial involvement in many who complain of vesical symptoms and indefinite pains in the back, perineum and testicles.

The most probable locations of these infections are the prostate, seminal vesicles, verumontanum, vas deferens, epididymi and pelvic organs in the female. Of these organs the verumontanum is most capable of producing reflex symptoms which are most difficult to clear up. I think it would not be out of place here to utter a word of warning on the venereal disease question. While undoubtedly, venereal diseases will be better treated in the future, not only by better methods but also by a more intelligent knowledge of their serious consequences, yet I feel we are not in a position to promise sure or easy cure (which may mean less respect for these infections) but rather that our influence must be used to prevent these infections, certainly morally, legally and perhaps medically because we owe it to the public and future generations. One of the most serious of all genito urinary infections is an infection by the spirochete pallida but a discussion of its significance is beyond the limits of this paper. Let me say however, that the early diagnosis of syphilis must necessarily be urological work, for I am convinced that the most up-to-date method of treating locomotor ataxia is the early diagnosis of the presence of the spirochete pallida in the primary lesion by the dark field followed by immediate and energetic anti-syphilitic treatment.

In concluding, let me say the more I see of urinary infections the more I realize their seriousness. In the upper tract, medicine of to-day realizes that the function of the kidney is all important and often a more intelligent knowledge of the state of the kidneys can be obtained from knowing their function than from urinary findings. Repeated general infections probably always leave some trace of their action during kidney elimination and if you add to this a local infection the workable margin (half of one kidney) may be seriously impaired. That these infections are hard to clear up is without doubt true as many tend to chronicity with recurrences, unless the causes are removed not only in the urinary system but also any systemic causes such as foci of infection or errors in metabolism. Many of these are accidents in natural life, but unfortunately many are contracted by those who do not realize their seriousness, a fact for which the profession must assume responsibility.

GARGLES AND SPRAYS

J. W. CRANE, M. B., LONDON, ONT.

The pioneer work of Ehrlich on chemotherapy emphasized the limited field of usefulness of germicides. The problem is to find a chemical that will destroy the infective organisms and leave unharmed the body cells. The differences in structure of these cells, either chemical or physical, must be slight. Arsphenamine is far from being the ideal germicide in the treatment of syphilis, because, at times, untoward results are noted, jaundice, nephritis and even death.

During the recent influenzal epidemic, the public was urged by the daily press and at times by the profession to use gargles and sprays, e. g., of listerine, glycothymoline, peroxide, etc., and thus prevent the spread of this dread disease. Evidently, too high a value has been placed on the efficiency of such preventive measures. The amount of time that the chemicals are in actual contact with the mucous membrane is very limited. The germicidal effect would need to be almost instantaneous. It is not surprising, then, that investigations would indicate that gargles and sprays are futile. The American Public Health Association (1) goes even farther and teaches that they may actually do harm. The protective mucous may be removed and thus increase the liability of actual entrance of the infective organisms. No germicide strong enough to be efficient can be applied to the nose or throat without, at the same time, injuring the mucous membrane.

The domestic use of gargles and sprays is liable to lead to a common employment in families, of the same utensils and thus spread the infection.

¹— *American Public Health Association, Influenza Bulletin, Minnesota Public Health Association Journal*, 17, Dec., 1919.

**PRINCIPLES OF EVALUATION OF PENSIONS LAID DOWN BY THE MINISTRY OF
PENSIONS FOR THE GUIDANCE OF MEDICAL BOARDS IN GREAT BRITAIN**

CAPT. A. T. BOND, London, Eng.

Administration of pensions throughout the United Kingdom is controlled by the Headquarters of the Ministry of Pensions in London. For the purposes of local administration the country is divided into regions, of which there are seven in England. Each region has a central Headquarters. The medical work is under the control and administration of the Commissioner of Medical Services. Boards are located as centrally as possible in each area, under the supervision of a Deputy Commissioner of Medical Services. Their sphere of action extends to a radius of 25 miles. Scotland, Wales and Ireland are divided into areas in the same way.

The duty of a Medical Board dealing with the claim of a soldier in respect of disability, is to decide whether or not his health has suffered an impairment since his entry into the Army. They must determine first, whether such impairment is attributable to, or has been aggravated by, the man's service, and secondly, what is the degree of the man's incapacity. The Medical Boards also re-examine from time to time men who have been granted pensions for temporary periods. They must also consider and recommend any medical treatment which may be necessary to restore the man to health, or improve his condition.

The question whether a condition is attributable or has been aggravated only, is a matter of vital importance. If a man has suffered impairment in health since joining the Army, it must be considered whether such impairment has been caused by service or whether an existing disability has been aggravated by service. "On" is not synonymous with "by" in the administration of the British scheme. The determination of this point has been one of the greatest difficulties of the Pension Ministry, who have on the one hand to procure for the man the compensation due to the effects of service on his health, and on the other to protect the State from unsupportable claims. The official view is that unless it is clear that the balance of probability is against the man, the benefit of the doubt shall be given to him. It is understood, however, in this connection that there must be a real doubt. The absence of proof to the contrary does not necessarily establish a man's claim. Much will depend upon where the man has served, and in what capacity. If he has fought or served abroad in bad climates, or under trying conditions, it is a fairly simple matter, as a rule, to answer this question, but where a man has only served at home and for a short period, there is then considerable difficulty in arriving at a decision.

Wounds or loss of members resulting from the action of the enemy, or carelessness of a comrade are, of course, attributable. Accidents other than from lethal weapons, or explosives, are carefully investigated. In these and other questions of similar nature, the man is given the benefit of the doubt. In considering the amount of aggravation of pre-existing loss of members, or of deformities, much attention is given to the nature of the man's employment in the Army. In mental diseases it is considered that a man discharged on account of certifiable insanity, should be regarded as pensionable, unless definite evidence is forthcoming that he was subject to insanity, including idiocy and advanced imbecility, at the time of enlistment, although prior to enlistment he may have had one attack of certifiable insanity. When, however, a man has had more than one attack prior to enlistment, evidence is required that the recrudescence of the disability has been caused, or aggravated by war service. If a period has followed his war service during which he has been able to follow an ordinary civilian life, if no reasonable connection can be traced between the attack of insanity and the man's previous naval or military service, he is not regarded as pensionable. Feeble-mindedness of moderate degree is ignored in the assessing of a case for pension purposes. When a man suffers from an attack of insanity subsequent to enlistment, the mere fact that the insanity is of a character which is probably produced by epilepsy, the epilepsy having existed before enlistment, does not disentitle him to pension. Insanity associated with syphilis, including general paralysis of the insane, is only regarded as not pensionable if the man has shown definite evidence of cerebral diseases before enlistment. Insanity associated with alcoholism is not regarded as unfavorable to a man's claim for pension, when the alcoholism has followed great mental or physical exhaustion, head injury, concussion, sunstroke, debilitating illness, or a fever, the results of war service. A history, however, of delirium tremens, or severe alcoholism prior to enlistment, or during service, is prejudicial to such a claim for pension.

The so-called "Neurasthenia" cases are examined by a Board of Neurologists, who assess their disability according to their apparent incapacity. These assessments are gradually lowered at subsequent examinations. Appeals against reductions are seldom successful in procuring increases. The policy is to gradually eliminate pensions in these cases. Treatment is arranged at special Neurological Institutions, when indicated.

Tuberculosis developing overseas is regarded as attributable or aggravated. If developed at home, it is regarded as attributable or aggravated unless the Medical Board is satisfied that the disease existed on entry, and has not been aggravated by service. A great deal depends upon the man's employment and environment while in the Army, and whether these were, or were not, conducive to such trouble. It is considered not possible to fix any limits of time either for the admission or exception of attributability in tuberculosis. It is agreed that pre-disposing conditions during service extends the period during

which attributability may be reasonably assumed. The conditions in which a man has lived after his discharge have an important bearing upon the development of the disease. Pulmonary tuberculosis can only be definitely stated to be attributable to service, if during the service there have been symptoms indicative of disease, hæmoptysis, or pleurisy with effusion. If, however, a man is discharged in good health and develops phthisis within six months of his discharge, it is considered good evidence that the disease has arisen in consequence of his service. Pleurisy, chronic bronchitis, gassing, injury of the chest wall, impaired general health, if followed within six months by pulmonary tuberculosis, the ethnological connection is admitted. Conditions of service are also taken into account in deciding this point, exposure, lengthy service under conditions of wet and mud, working in dusty atmosphere, sleeping in overcrowded quarters, prolonged strain, or overwork.

In diseases of the heart the possibility of aggravation is large. The determination of pensionability depends mainly upon the man's condition on entry, and the nature of employment before enlistment, and while in the Army.

Uncomplicated errors of refraction are not considered due to, or aggravated by service. Hypermatropia may, as the result of trauma in the various forms, show for some time a weakening power of accommodation, but there must be definite evidence of trauma. Myopia of high degree with exposure to high explosives, etc., can be connected with such conditions as hæmorrhage into the fundus or of the retina, or both. Amblyopia is usually congenital, but occasionally functional, and in these cases general nervous disturbances should be looked for.

In the matter of hearing, where there is evidence of pre-existing disease, it is assumed that if the man was passed for service and retained for any considerable time under training and discipline, his hearing was considered good enough for practical purposes. If, then, a degree of deafness is found which is incompatible with this, the benefit of the doubt is given to the man and the disability is considered to be attributable to, or aggravated by military service, unless this is clearly due to some other cause.

Cancer is never considered attributable to military service. Sarcoma may exceptionally be attributable to military service as a result of injury; aggravation is very rarely caused by military service.

It is considered that epilepsy in a large majority of cases has existed prior to enlistment, so that the degree of aggravation only is to be considered.

It has been found in connection with gas poisoning, that only a small percentage of men who have been gassed in the field, sustain any permanent ill effects therefrom.

The basis of assessment is the man's physical capacity as compared with that of the ordinary healthy man of the same age. In no case is the man's pre-existent occupation taken into account in the consideration of his disability. The Medical Board attempts to arrive at an estimate of the average of a man's

disability, covering the period for which a recommendation is made, up to the date when the man's re-examination is to take place. An attempt is made to avoid frequent medical examinations. If a man's condition becomes worse in the interim he is re-examined.

Cases of chronic diseases affected by the seasons are assessed at an average rate to cover both summer and winter. Many soldiers are discharged with more than one disability. The degree of disablement is not assessed by adding the percentage values; the disabilities are considered together and the assessment made after a full consideration of the results of examination. In some cases the greater disability will include the lesser, whereas in some cases the assessment will be more than the greater disability, but less than the condition of the two disabilities. Assessment is not influenced by the necessity for treatment. If a man accepts treatment, special provision is made by means of treatment allowances to enable him to obtain this without any loss.

A discharged soldier is entitled to compensation for a deformity, although his earning capacity may be undiminished. For example, in extensive wounds of the jaw, a man may be able to work at his previous employment, but may require a very special diet, owing to his inability to chew. He would therefore be entitled to special consideration. Men having injuries to the face causing disfigurement, are considered to be entitled to a higher rate of pension than men having similar injuries elsewhere.

The degree of disability attendant on amputations are established by a schedule. Amputation hip joint, is 80 per cent. Other thigh amputations, 70 per cent. Amputations below middle of thigh, including one through the knee joint, 60 per cent. Cases of loss of use of a limb, or part of it, are assessed as if amputation had taken place at the point where uselessness begins, viz.: a man with a useless hand should be assessed at a rate not higher than amputation at the wrist.

The degree of disability in total deafness is considered 70 per cent.; no allowance for suppuration, as such, is considered. Every encouragement is given to the man to undergo treatment. In assessment of disability for deafness, consideration is given to the loss of the amenities, i.e., the inability to enjoy concerts, etc., owing to defective hearing of less degree than C.V. 20 feet.

In assessing the disability from epilepsy, two factors are taken into account, first, actual loss of working capacity, second, the handicap in the labor market as a result of the prejudice against epileptics on the part of employers and fellow-workmen. The occurrence of a fit once a month is considered to detract 20 per cent. from the man's capacity.

Cases of tuberculosis on discharge from sanatoria are given, unless in exceptional cases, at least 60 per cent. for a year from the date the man leaves the sanatorium. Many cases are given renewal of pension at a high rate even after the lapse of a year. Many require a permanent pension at 30 to 40 per cent.

In determining the disability from other chronic diseases, the history of the man is thoroughly reviewed for the past six months, and an estimate is made of the loss of time on account of disease, discomforts and inconveniences he has experienced while carrying on.

Men with disabilities under 20 per cent. are awarded gratuities. These are graded from £25 to £100.

In no case is a Board's recommendation communicated to the man.

Current Medical Literature

SOME PRACTICAL CONSIDERATIONS ON THE OPERATION FOR REMOVAL OF ADENOIDS AND ENUCLEATION OF TONSILS

W. H. BOWEN, F.R.C.S.

British Medical Journal, Oct. 4th, 1919, No. 3066.

This paper aims at setting out some practical considerations gradually forced upon the author by an experience covering some fourteen years. Reference is made to the disappointment following partial removal of the faucial tonsils in former years due to the recurrence of the trouble in the remnants of the tonsil. He very strongly advocates the removal of tonsils, and by removal he means enucleation with the capsule intact by means of the ordinary Mackenzie tonsillectome. The English surgeons, Willis and Pybus, are very properly given the credit for introducing this method. The whole operation can be performed after a little practice as quickly as the former cutting (and partial removal), and with incomparably greater benefit to the patient. The aims of the operation for adenoids are by removing them to eliminate a source of continuous infection from the naso-pharynx, and to make nose breathing possible or better, and by enucleating the tonsils to remove an actual or potential infective focus from the throat. Early childhood is the best time for removal, so as to avoid the troublesome aural complications in later years. Of all the indications for operation the forestalling of deafness is the most important. The frequency with which children who are considered stupid or inattentive develop early deafness is pointed out. They readily learn to read the lips, and the deafness is thereby masked. Otagia, or earache with or without aural discharge or noticeable deafness, should always demand a careful examination of the naso-pharynx. Acute middle ear suppuration and mastoiditis in children is nearly always due to infection in the naso-pharynx, and when adenoids are present the author advocates their removal at the completion of the mastoid operation.

Attention is drawn to the varying degrees of nasal obstruction caused by adenoids. Some cases may have a persistent nose cold, marked mostly by nasal discharge without any noticeable snoring or heavy breathing while asleep. This depends upon the relative size of the adenoid mass and the naso-pharyngeal space. Nasal obstruction due to intra-nasal causes have to be excluded. Dental caries of the central incisors, due to their constant exposure to the air in mouth-breathers, is frequently present. Chronic cough is also frequent in children, due to the pharyngeal irritation caused by mouth-breathing. Enlargement of the cervical glands often occurs with enlarged faucial tonsils, and disappears after the tonsils have been removed. In these cases greater care in the

after treatment of patients should be given so as to avoid any subsequent breaking down of the glands. Enlarged tonsils may harbor the *B. diphtheria* long after the clinical signs in the throat have disappeared. Swabs may remain positive until the tonsils containing the foci have been removed.

Adenoids should be removed in one mass, and care should be taken to remove the upper limit of the faucial tonsil in cases of recurring quinsy. Operation for adenoids under two years of age is very seldom required. Once the tonsils have been the seat of tonsillitis they should be removed, but with only slight enlargement and no history of inflammation in children under four years of age they may be left, and the adenoids, if producing definite symptoms, alone removed. The removal of the tonsils adds considerably to the gravity of the operation. The author strongly insists on the necessity of instruction to the parents that children should after operation be taught to breathe with the mouth shut. Failure to cure the nasal obstruction is more often due to this than to incomplete operation. After twelve years of age the difficulty may be insurmountable.

The complications mostly to be feared are hæmorrhage and sepsis. The former frequently conduces to the onset of the latter by lowering the vitality. In the author's experience hæmorrhage has only been severe in patients over 15 years of age. He never operates on cases with acute inflammation until a month has elapsed. Two nights before the operation calomel is given, followed by a saline, and abstinence from meat is enjoined for two reasons; first, that no portions should be left round the teeth as infective foci, and secondly, that proteins shall not raise the blood pressure immediately before the operation.

The after care is very important—rest in bed and avoidance of cold and draughts are important. Ethyl chloride is favoured as an anæsthetic, next chloroform, and lastly ether. The author is against ether, owing to the congestion and secretion which it sets up. In no case does he commence the operation until some return of the pharyngeal reflex is present. Minute instruction is given to secure enucleation with the tonsillictome. (Most failures are due to not having acquired the "trick.") The instrument must be sharp enough to cut through a thin layer of mucous membrane, and blunt enough to take the line of natural cleavage between the tonsil and the pharyngeal wall.

PERRY GOLDSMITH.

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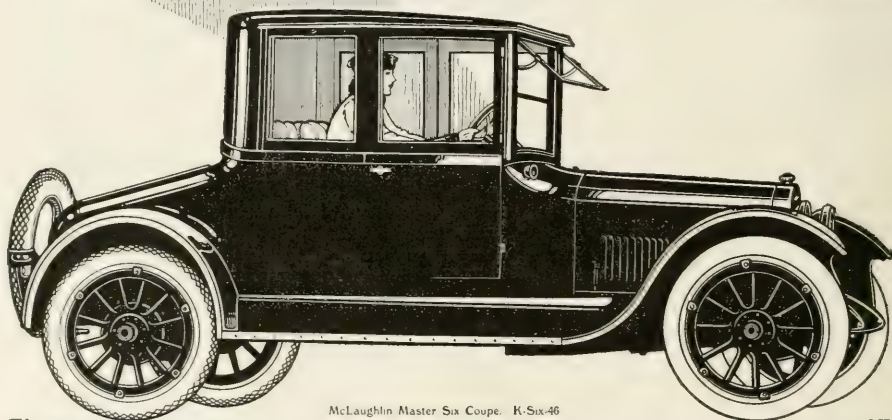
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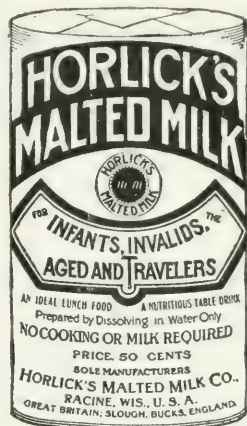
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Abstracts

SMOKING AT WORK.

The question of labour efficiency in relation to tobacco-smoking has been revived in a prominent fashion by the increasing practice of smoking in the workshops. It seems clear that in many cases the practice is tolerated by authority, and the anti-tobacco protagonists may soon be expected to put forward their case against this innovation, based on the ills to which it may give rise, when the evils of nicotine will be emphasised. The abuse of tobacco is well recognized, and that the smoke from it, especially when inhaled, has definite toxic properties must be admitted. A few years ago we furnished analysis from *The Lancet* Laboratory showing how the smoke from cigarettes, pipes, and cigars differs, amongst other things, in nicotine content. The result showed that while nicotine is a highly poisonous constituent of tobacco, the evidence was not conclusive that this alkaloid invaded the consumer to the extent hitherto accepted. There was more nicotine found in the smoke from the cigar and pipe than from the cigarette, the suggestion being that in the last case a large proportion of the nicotine was destroyed by combustion. There are, however, other bases found, probably of a toxic character, and there is present also an appreciable amount of carbon monoxide. Certain processes which entail the manipulation of poisonous materials, such as lead and arsenic, must always contraindicate smoking, since the toxic substances may be carried to the mouth by soiled fingers, pipe stems, or cigarettes, and the same contra-indication exists where there is risk of fire or explosion. But when all is said we must face the fact that those who have acquired the habit of smoking are more contented when permitted to indulge in it and are irritable when it is prohibited. To-day the psychology of the worker is rightly receiving more and more attention, and a real and strong case must exist before anything which promotes contentment is prohibited. Smoking on an empty stomach—e.g., before breakfast and more than three hours after the last meal—seems to be felt injuriously by many subjects, while smokers generally appear to hold that smoking directly after meals promotes digestion; the belief is widespread and calls for consideration. The custom now rapidly increasing in industrial work of introducing short mid-morning and mid-afternoon pauses, during which time tea-trolleys go round with light refreshment—a practice recommended so long ago as 1861 by medical men—provides reasonable opportunities for allowing smoking. Cases have even been quoted of in-

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creased output following permission to smoke; but we are not aware of any data of scientific value either to justify or to contradict this claim. The question, which is not without importance, calls for investigation, and, we suggest, is worth the attention of the Industrial Fatigue Research Board.—*Lancet*, July 17, 1920.

THE BOGUS "DOCTOR".

From *The Lancet*, July 17, 1920.

The medical profession is unfortunate in that it apparently offers more temptation than any other to fraudulent persons to pretend to be members of it with a view to victimising their fellows. Having once done so, they find the way of the transgressor easy so long as it remains open, and even after having been caught and convicted they are apt to resume their evil courses at the earliest opportunity. In short, the bogus doctor is a criminal who is a specialist, just as much as the abortionist, who is sometimes a bogus doctor, the trained pickpocket, or the blackmailer, and he is assisted by the credulity of others. Medical men, if not actually brought in contact with him, and even those who are, do not always take the precaution of establishing his identity, and laymen, who fall into his hands, being usually members of the more ignorant classes, have not sufficient knowledge or of sufficient observation to detect him. A man convicted at Bow-street a short time ago and sentenced to nine months' imprisonment with hard labour was an example of the sham-medical recidivist, for he had quite recently undergone 18 months' imprisonment for posing as a medical practitioner and signing death certificates when acting as a locum tenens. He was an instance of ability to impose easily upon a selected victim, for he had obtained £25 from a cartage contractor, presumably a business man, by pretending to be a medical practitioner and to have invented a cure for cancer which he valued at £40,000—a story which would have secured his undoing if told to a medical man. The imposter had, as a matter of detail, first made the acquaintance of the prosecutor at a watering place by saluting him as a brother freemason, and giving correctly the signs and tokens of the degree which he claimed to have. Whether he was in fact a freemason, and how far the belief that he was one assisted him in obtaining the money, is not stated, but it may be worth the while of medical men to note the case. We do not recall any previous instance of this method of self-introduction or self-recommendation being employed for the purpose of fraud. It will therefore be as well to remember that the credentials of a stranger desiring to be engaged as a locum tenens or accepted as a medical colleague are not to be

considered with less care because he also alleges the common bond of freemasonry. As has been suggested above, to judge from the frequency with which cases are reported in the newspapers, no other learned profession is so liable to temporary adoption for nefarious purposes as medicine. Sham officers abound, but they are a temporary by-product of the war. The Church and the Law offer few opportunities to the dishonest, and sham solicitors, if they occur occasionally, can only expect success so long as they can keep out of contact with genuine members of the legal profession. This is not easy for them to do, and their sphere of operations is thus narrowed considerably.

LUMBAR PUNCTURE FOR THE RELIEF OF OCULAR SYMPTOMS DUE TO METHYL ALCOHOL POISONING.

M. ZETHELIUS (*Hygiea*, January 31st, 1920) notes that methyl alcohol poisoning is increasing in frequency, and that hitherto no satisfactory treatment has been devised for the ocular symptoms provoked. In three cases he has had recourse to frequently repeated lumbar puncture, with strikingly good effects in one case, good effects in another, and comparatively good effects in the third case. As methyl alcohol or its decomposition products have been found in the cerebro-spinal fluid in cases of poisoning, the author suggests that lumbar puncture may be beneficial not only by relieving pressure, but also by withdrawing poisons from direct contact with the central nervous system.

LOSS OF BOTH EYES IN GRAVES'S DISEASE.

F. H. LAHEY, (*Boston Med. and Surg. Journ.*, April 22nd, 1920) records the case of a woman in whom exophthalmos was so great as to necessitate, in October, 1917, enucleation of the right eye in consequence of oedema and ulceration of the cornea. A month later the superior cervical sympathetic ganglion was removed on the left side; at the same time the external canthus was incised. The exophthalmos, oedema, and ulceration continued to increase, and two days later the lids were sutured together; in December, 1917, this eye had to be removed. The patient is still alive, and is said to be improving in general health;—B. M. J. July 17, 1920.

AMENORRHEOA AND MARRIAGE.

A. SIREDY (*Journ. de med. et de chir. prat.*, April 25th, 1920) emphasizes the importance of a minute medical examination before marriage in every young woman aged from 18 to 20, who has not yet menstruated, whether the prodromal symptoms of the monthly period have occurred or not. He insists on the fact that individuals well formed in

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other respects and of a distinctly feminine appearance may present anomalies of the genitals incompatible with marriage, such as pseudo-hermaphroditism, or complete absence of the uterus, with an absent or rudimentary vagina. Absence of menstruation is not necessarily associated with such serious anomalies. In most young women who have not menstruated normal genital organs are found. Cases have even been recorded of women who have never menstruated giving birth to six or nine children. In addition to primary amenorrhoea one has to consider the amenorrhoea following surgical operations—for example, hysterectomy for fibroids or pelvic suppuration. Although maternity is out of the question in such cases, marriage is not to be forbidden provided the fiancé realizes the condition.—B. M. J., July 19, 1920.

SURGICAL RISKS IN DIABETICS.

N. B. FOSTER (*Annals of Surgery*, March, 1920) recognizes that diabetes can only be diagnosed and its severity estimated by determining the degree of hyperglycaemia. He discusses the effects of chronic infections on diabetics; the blood sugar increases, and even though the patient takes scarcely any food sugar increases in the urine. The decrease in the metabolism of glucose is shown by some degree of acidosis even after the infection has passed. Glycosuria is occasionally manifested after anaesthesia, so that in diabetics there is definite danger of post-anaesthetic acidosis. In diabetes the low resistance of the tissues to infection must be remembered. Estimation of the CO₂ combining power of the blood (normally above 55 per cent.) gives an indication of the degree of acidosis. Any patient showing hyperglycaemia of over 0.35 per cent. (even if there is no acidosis before operation), or a CO₂ combining power of less than 40 per cent., will not survive any operation unless before performing the operation there is time to change the metabolic state. In some cases fasting causes rapid decrease of hyperglycaemia and acidosis; but if surgical infections are present Foster states that fasts are not uncommonly accompanied by a rapid increase of acidosis; these cases must be fed. Fats and carbohydrates are contraindicated. Protein must be given, as lean meat and eggs, with small amounts of green vegetables as a relish. Fast days may sometimes be interpolated. The food intake must not at this period exceed 300 calories daily. In acidosis Foster uses sodium bicarbonate; 10-15 grams are given subcutaneously, emulsified in 10 c.cm. of olive oil. Cases of virulent infections of the cellulitic type do not respond to any procedure, but for surgical conditions other than infections (for example, carcinoma of the breast) it may be possible even in moderately severe diabetes to give operative relief.—B. M. J., July 17, 1920.

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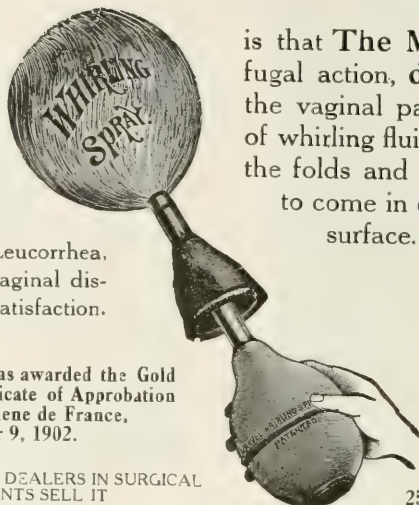
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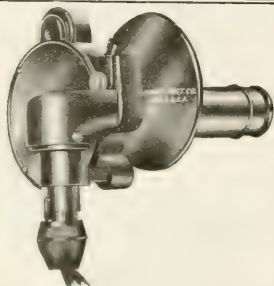
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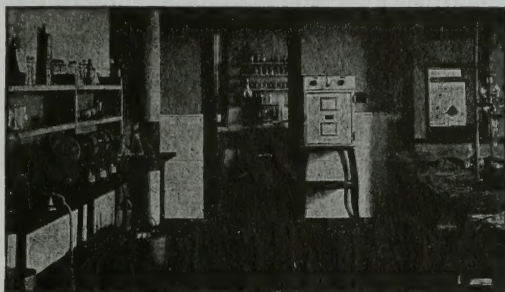
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